IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPEAL BRIEF – 37 C.F.R § 1.192

U.S. Patent Application 10/709,416 entitled:

"*An Efficient Locking Protocol for Sub-Document Concurrency Control Using Prefix Encoded Node Identifiers in XML Databases*"

Real Party in Interest: International Business Machines Corporation

Related Appeals and Interferences:

None

Status of Claims:

Claims 1-21 are pending.

Claims 1-3, 5, 12-14 and 19-21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Bray et al. (U.S.P. 6,529,905).

Claims 4, 6-11 and 15-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bray et al. in view of Sadjadi (U.S.P. 6,850,938).

Claims 1-21 are hereby appealed.

Status of Amendments:

No after-final amendments were filed after the Final rejection of 6/19/2007.

Summary of Claimed Subject Matter:

(NOTE: All citations are made from the original specification)

The present invention's independent **Claim 1** teaches a method for controlling concurrent access of prefix encoded nodes in a hierarchically structured document **(see paragraphs [0008], [0009])**, wherein the method comprises the steps of: (a) processing an explicit lock request on a node by determining ancestor nodes from said node **(see paragraphs [0008], [0009])**, (b) deriving implicitly from said explicit lock request, a set of locks for said determined ancestor

nodes **(see paragraphs [0042] [0045])**, (c) comparing said derived set of implicit locks with existing lock modes for said determined ancestor nodes **(see paragraphs [0010], [0023] [0024] [0030])**, and (d) granting or denying said explicit lock request on said node based on results of said comparing step **(see paragraphs [0010] [0020] [0021])**.

The present invention's independent **Claim 12** teaches an article of manufacture comprising a computer usable medium having computer readable program code embodied therein which implements concurrent access control of prefix encoded nodes in a hierarchically structured document **(see paragraphs [0008], [0009], [0044], [0045])** comprising modules implementing code for: (a) processing an explicit lock request on a node by determining ancestor nodes from said node **(see paragraphs [0008], [0009])**, (b) deriving implicitly from said explicit lock request, a set of locks for said determined ancestor nodes **(see paragraphs [0042] [0045])**, (c) comparing said derived set of implicit locks with existing lock modes for said determined ancestor nodes **(see paragraphs [0010], [0023] [0024] [0030])**, and (d) granting or denying said explicit lock request on said node based on results of said comparing step **(see paragraphs [0010] [0020] [0021])**.

The present invention's independent **Claim 19** teaches a system for controlling concurrent access of prefix encoded nodes in a hierarchically structured document **(see paragraphs [0008], [0009])**, wherein the system comprises: (a) a processor receiving as input, an explicit lock request on a node and providing as output ancestor nodes determined from said node **(see paragraphs [0008], [0009])**, (b) a converter receiving as input said explicit lock

request and deriving as output a set of implicit locks for said output ancestor nodes **(see paragraphs [0042] [0045])**, (c) a comparator comparing said derived set of implicit locks with existing lock modes for said output ancestor nodes **(see paragraphs [0010], [0023] [0024] [0030])**, and (d) a lock request grantor, granting or denying said explicit lock request on said node based on output of said comparator **(see paragraphs [0010] [0020] [0021])**.

The present invention's independent **Claim 20** teaches a method for controlling concurrent access of prefix encoded nodes in a hierarchically structured document, wherein the method comprises steps of: (a) processing an explicit lock release on a node by determining ancestors nodes from said node; said explicit lock release requested by a transaction **(see paragraphs [0008], [0009])**; (b) deriving from said explicit lock release, a set of implicit lock modes for said determined ancestor nodes **(see paragraphs [0042] [0045])**, and (c) releasing locks on determined ancestor nodes corresponding to said derived implicit lock mode; said locks on determined ancestor nodes originally requested by said transaction **(see paragraphs [0010] [0020] [0021])**.

The present invention's independent **Claim 21** teaches an article of manufacture comprising a computer usable medium having computer readable program code embodied therein which implements concurrent access control of prefix encoded nodes in a hierarchically structured document **see paragraphs [0008], [0009], [0044], [0045])** comprising modules executing: (a) explicit lock request processing on a node by determining ancestor nodes from said node **(see paragraphs [0008], [0009])**, (b) implicit derivation of a set of locks for said

determined ancestor nodes from said explicit lock request **(see paragraphs [0042] [0045])**, (c) a comparison of said derived set of implicit locks with existing lock modes for said determined ancestor nodes **(see paragraphs [0010], [0023] [0024] [0030])**, and (d) granting or denying said explicit lock request on said node based on results of said comparing step **(see paragraphs [0010] [0020] [0021])**.

Grounds of Rejection to be Reviewed on Appeal:

Claims 1-21 are hereby appealed

1. Was a proper rejection made under 35 U.S.C. § 102(b) using existing USPTO guidelines?

2. Was a proper rejection made under 35 U.S. C. § 103(a) using existing USPTO guidelines?

ARGUMENT:

1. Was a proper rejection made under 35 U.S.C. § 102(b) using existing USPTO guidelines?

Claims 1-3, 5, 12-14 and 19-21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Bray et al. (U.S.P. 6,529,905). To be properly rejected under 35 U.S.C § 102(b), **each and every** claim element or feature must be shown in a single reference (i.e., in this case, the Bray et al. reference). Applicant respectfully disagrees with the Examiner that the claims are taught by the cited art. The Manual for Patenting Examining Procedure (MPEP) § 2131 clearly sets forth the standard for rejecting a claim under 35 U.S.C. § 102(e). "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (MPEP § 2131, quoting Verdegaal Bros. v. Union Oil Co. of California 2 USPQ2d 1051, 1053 (Fed Cir. 1987)). In this case, the cited art (i.e., Bray et al.) fails to teach the claimed invention as required by the MPEP.

Specifically, claim 1 recites a method for controlling concurrent access of **prefix encoded nodes** in a hierarchically structured document. Bray et al. do not disclose such nodes in their system. Thus, Bray does not anticipate claim 1 as meant under 35 USC §102. With regards to this argument on page 13 of the Final Office Action of 06/19/2007, the Examiner states that Figure 3 and column 5, lines 4-32 of Bray teach such a feature of "prefix encoded nodes". The Examiner further states that the grouping of nodes in Bray's Figure 3 teaches identifiers such as "Document", "Volume", "Section" or "Requirement" and further asserts that Bray's Figure 3 also teaches unique identifiers

such as "A", "B", or "1". Bray's Figure 3 is reproduced below:

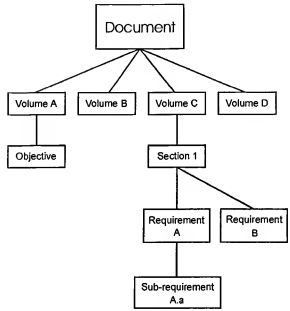

FIG. 3

First, it can be seen from the above figure that the identifiers are not "unique", as the identifier "A" is used in the node titled "Volume A" and is also used in a separate node titled "Requirement A". Similarly, the identifier "B" is used in the node titled "Volume B" and is also used in a separate node titled "Requirement B". This is by no means unique. Further, the nodes shown in Figure 3 are by no means "prefix encoded nodes". Prefix encoded nodes, as outlined in the instant application, "exploits a property in which a current node ID is comprised of node IDs of ancestor nodes along the path from the root to a current node". As can be seen from the Examiner's citation, the node ID of a child node such as "Objective" **CANNOT** be a prefix encoded node as it not comprised of node IDs of the ancestor nodes, i.e., node IDs of Volume A and Document. Hence, it

is respectfully submitted that the Examiner is erroneously interpreting a tree of nodes to read on the feature of **prefix encoded nodes**.

Applicants' Figure 3A is provided below for the purpose of illustrating a prefix encoded node. As can be seen below, node L with value 08341A40x is comprised of values nodes H (08341Ax), D (0834x), B (08x), and A (00x), via the path from A to L. It is clear that Bray fails to teach or suggest such prefix encoded nodes.

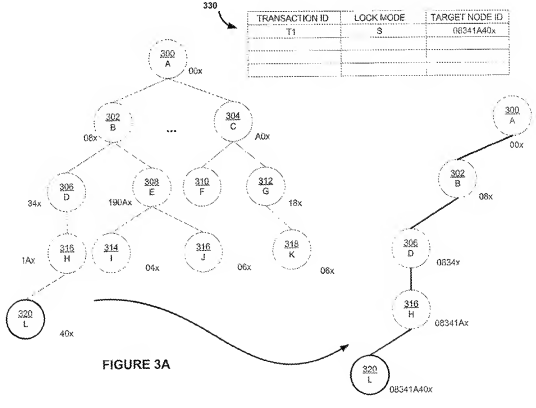

FIGURE 3A

Further, the Examiner further erroneously states that such group identifiers "always appear before the unique identifier and is encoded into the node via a document type definition". The Examiner's citations and the referenced Figure do not make any

mention of "prefix encoding nodes" or even encoding nodes. The citation of Column 5 merely states that "**The use of XML allows nodes and subnodes to be established in the document type definition (DTD) as specified in the XML specification**." Applicants are unsure how the Examiner is interpreting such statements regarding establishment of nodes and subnodes in a DTD to read on Applicants' feature of prefix encoded nodes.

Applicants maintain that the Bray reference neither teaches nor suggests such prefix encoded nodes. Hence, because of the lack of prefix encoded nodes, Bray et al. cannot anticipate or render obvious the features of claim 1.

Further, claim 1 recites ***implicitly deriving*, from an explicit lock request, a set of locks for said determined ancestor nodes.** Again it should be noted that such implicit derivation is only possible because of the nodes being "**prefix encoded nodes**" (see paragraph [0027]). Specifically, such derivations are only possible because we exploit the fact that prefix encoded nodes always comprise node IDs of ancestor nodes along the path from the root to a current node, which allows the present invention to "***derive implicitly* from said explicit lock request, a set of locks for said determined ancestor nodes**".

In contrast, Bray et al. must explicitly check a parent node to determine if there is a lock present on the parent node; so any subsequent lock in Bray et al. is not implicitly

derived from the explicit lock request, as recited in claim 1. Furthermore, as seen in step (c) of claim 1, the claim is referring to implicit locks, whereas Bray et al. disclose only explicit locks. For at least these reasons, Applicants urge that Bray et al. do not identically disclose every feature of claim 1 and, therefore, do not anticipate claim 1 as meant under 35 USC §102 .

Applicants maintain that the Bray reference neither teaches nor suggests such implicit derivation of a set of locks for determined ancestor nodes from an explicit lock request. Hence, Applicants maintain that Bray et al. cannot anticipate or render obvious the features of claim 1.

Further, since Bray et al. fail to teach a derived set of implicit locks for the ancestor nodes, Applicants maintain that it would be erroneous to argue Bray et al. teaches a comparison step of "***comparing said derived set of implicit locks* with existing lock modes for said determined ancestor nodes**".

Hence, at least for the reasons set forth above, Applicants respectfully state that the Bray reference fails to teach or suggest many of the features of the claim 1.

The above-mentioned arguments for independent claim 1 substantially apply to independent claim 12 as it recites an article of manufacture that stores computer readable program code that implements the steps of independent claim 1. Hence, at least for the

reasons set forth above, Applicants respectfully state that the Bray reference fails to teach or suggest many of the features of the claim 12.

The present invention's independent **Claim 19** teaches a system for controlling concurrent access of **prefix encoded nodes in a hierarchically structured document**, wherein the system comprises: (a) a processor receiving as input, an explicit lock request on a node and **providing as output ancestor nodes determined from said node**, (b) a converter receiving as input said explicit lock request and **deriving as output a set of implicit locks for said output ancestor nodes**, (c) a comparator **comparing said derived set of implicit locks with existing lock modes for said output ancestor nodes**, and (d) a lock request grantor, granting or denying said explicit lock request on said node based on output of said comparator.

Similar to claim 1, claim 19 also recite the feature of ***prefix encoded nodes* in a hierarchically structured document** and further recites the features of **deriving a set of implicit locks from the node** and **comparing the derived set of implicit locks with existing lock modes for the ancestor nodes**. Thus, for at least the reasons provided above with respect to claim 1, Applicants urge that Bray also does not teach every feature recited in independent claim 19, and, therefore, does not anticipate these claims as meant under 35 USC §102 .

The present invention's independent **Claim 20** teaches a method for **controlling**

concurrent access of *prefix encoded nodes* in a hierarchically structured document, wherein the method comprises steps of: (a) processing an explicit lock release on a node by **determining ancestors nodes from said node**; said explicit lock release requested by a transaction; (b) **deriving from said explicit lock release, a set of implicit lock modes for said determined ancestor nodes**, and (c) **releasing locks on determined ancestor nodes corresponding to said derived implicit lock mode**; said locks on determined ancestor nodes originally requested by said transaction.

Similar to claim 1, claim 20 also recite the feature of ***prefix encoded nodes* in a hierarchically structured document** and further recites the features of **deriving from said explicit lock release, a set of implicit lock modes for said determined ancestor nodes**. Thus, for at least the reasons provided above with respect to claim 1, Applicants urge that Bray also does not teach every feature recited in independent claim 20, and, therefore, does not anticipate these claims as meant under 35 USC §102 .

Further, Bray also fails to teach the feature of **deriving from said explicit lock release, a set of implicit lock modes for said determined ancestor nodes**. The Examiner's citation with respect to this feature (i.e., column 6, line 60 through column 7, line 12 of Bray) merely teaches how an **edit lock is placed at a node level**. Applicants, however, respectfully assert that **Bray makes no mention of either determining ancestor nodes or the derivation of a set implicit lock modes from an explicit lock release**.

Therefore, Applicants respectfully assert that Bray cannot anticipate or render obvious the features of claim 20.

The present invention's independent **Claim 21** teaches an article of manufacture comprising a computer usable medium having computer readable program code embodied therein which implements concurrent access control of prefix encoded nodes in a hierarchically structured document comprising modules executing: (a) explicit lock request processing on a node by determining ancestor nodes from said node, (b) ***implicit derivation* of a set of locks for said determined ancestor nodes from said explicit lock request**, (c) **a comparison of *said derived set of implicit locks* with *existing lock modes for said determined ancestor nodes***, and (d) granting or denying said explicit lock request on said node based on results of said comparing step.

At least the reasons provided above with respect to claims 1, 12, 19, and 20, Applicants urge that Bray also does not teach every feature recited in independent claim 21, and, therefore, does not anticipate these claims as meant under 35 USC §102 .

The above-presented arguments with respect to independent claims 1, 12, 19, 20, and 21 substantially apply to dependent claims 2-3, 5, and 13-14. Hence, at least for the reasons set forth above, Applicants maintain that Bray cannot anticipate or render obvious the features of dependent claims 2-3, 5, and 13-14.

Hence, with respect to claims 1-3, 5, 12-14, and 19-21, Applicants maintain that an improper rejection was issued under 35 U.S.C. §102(b).

2. Was a proper rejection made under 35 U.S.C. § 102(b) using existing USPTO guidelines?

To establish a *prima facie* case of obviousness under U.S.C. § 103, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Additionally, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure (In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Applicants urge that there is no realistic motivation to combine the teachings of the references as suggested by the Examiner with any expectation of success.

The system of Bray et al. has simple rules that are binary – if a lock exists, do not grant a lock; otherwise grant it. (See column 7, lines 20-32). Applicants urge that adding three different type of locking levels as taught in Sadjadi would not "reduce computational costs" as suggested by the Examiner. Instead, Sadjadi would further

complicate the system of Bray et al. and Applicants urge that one of ordinary skill would not have been realistically motivated to modify Bray et al. in such a way to increase its complexity in an attempt to reduce computational costs. They are contradictory goals.

Furthermore, Sadjadi **teaches away** from the express teaching of Bray et al. in that Sadjadi includes a **"share" lock** so users can have concurrent access to a document in a read-only mode. In contrast, Bray et al. state that no locking mechanism is needed for simply viewing a document. (See column 6, lines 43-45).

For at least these two reasons, Applicants urge that one of ordinary skill would not have been realistically motivated to modify Bray et al. in view of Sadjadi as suggested by the Examiner. Without such motivation, there is no prima facie case of obviousness under 35 USC §103.

Additionally, these claims incorporate all the limitations from their parent claims 1 and 12. Applicants urge that the teachings of Sadjadi do not remedy the omissions discussed above with respect to Bray et al. and claims 1 and 12. Thus, neither individually or in combination, do these two references teach or suggest every feature recited in claims 4-11 and 15-18 and, therefore, do not provide the factual basis to establish a prima facie case of obviousness under 35 USC §103.

Furthermore, with respect to claims 6-8 and 16-18, these claims refer to intention

locking and particular steps in granting and applying these types of intention locks. Sadjadi is entirely silent about intention locks and many of the passages referred to in the statement of the rejection refer to optimistic locks. Optimistic locks are not the same as, or similar to, the implicit intention locks recited in these claims.

Because the combination of Bray et al. and Sadjadi do not teach or suggest all the features recited in claims 6-8 and 16-18, Applicants urge that no prima facie case of obviousness has been established and, therefore, request reconsideration and withdrawal of the rejection of these claims.

Hence, with respect to claims 4, 6-11, 15-18, Applicants maintain that an improper rejection was issued under 35 U.S.C. §102(b).

SUMMARY

As has been detailed above, none of the references, cited or applied, provide for the specific claimed details of applicant's presently claimed invention, nor render them obvious. It is believed that this case is in condition for allowance and reconsideration thereof and early issuance is respectfully requested.

This Appeal Brief is being filed with an extension of time fee. The Commissioner is hereby authorized to charge any deficiencies in the fees provided to Deposit Account No. 09-0460.

Respectfully submitted by
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Claims Appendix:

1. **(Original)** A method for controlling concurrent access of prefix encoded nodes in a hierarchically structured document comprising steps of:

a. processing an explicit lock request on a node by determining ancestor nodes from said node,

b. deriving implicitly from said explicit lock request, a set of locks for said determined ancestor nodes,

c. comparing said derived set of implicit locks with existing lock modes for said determined ancestor nodes, and

d. granting or denying said explicit lock request on said node based on results of said comparing step.

2. **(Previously Presented)** The method of claim 1, wherein said hierarchically structured document is an XML document.

3. **(Previously Presented)** The method of claim 1, wherein said node is comprised of data and a node identifier (ID).

4. **(Previously Presented)** The method of claim 3, wherein said explicit lock mode is any of: a shared (S), update (U), or exclusive (X) lock mode.

5. (**Previously Presented**) The method of claim 1, whereupon granting said explicit lock request, one or more of said implicitly derived locks are implicitly applied to said ancestor nodes.

6. (**Previously Presented**) The method of claim 4, wherein said implicitly derived lock mode is any of: an intention-shared (IS), intention-exclusive (IX), or a shared, intention-exclusive lock (SIX) mode.

7. (**Previously Presented**) The method of claim 6, wherein

a. an explicit lock request on said node in lock mode S implicitly derives a set of locks in IS mode,

b. an explicit lock request on said node in lock mode X implicitly derives a set of locks in IX mode,

c. an explicit lock request on said node in lock mode IS implicitly derives a set of locks in IS mode,

d. an explicit lock request on said node in lock mode IX implicitly derives a set of locks in IX mode, and

e. an explicit lock request on said node in lock mode SIX implicitly derives a set of locks in SIX mode.

8. (**Previously Presented**) The method of claim 7, wherein said lock request is denied if said

comparison step results in incompatibility and granted otherwise; said comparison step results in compatibility between said existing and derived lock modes if lock request mode for said node is:

a. IS and said ancestor nodes are locked in any existing mode of: IS, IX, S, or SIX,

b. IX and said ancestor nodes are locked in either existing mode of: IS or IX,

c. S and said ancestor nodes are locked in either existing mode of: IS or S,

d. SIX and said ancestor nodes are locked in existing mode of IS, and

e. X and said ancestor nodes are not currently locked; and

said comparison step results in incompatibility between said existing and derived locked modes, otherwise.

9. **(Previously Presented)** The method of claim 8, wherein said comparing step is facilitated by a logical data structure indicating existing lock information for each node; said logical data structure comprising logical lock tree nodes.

10. **(Previously Presented)** The method of claim 9, wherein said logical lock tree nodes are comprised of at least: a node ID field, a transaction ID field, and a lock mode field.

11. **(Previously Presented)** The method of claim 10, whereupon granting a lock request, a logical lock tree node for said node is created and ID of said node is inserted into said logical lock tree node ID field, a transaction ID is inserted into said logical lock tree node transaction ID

field, a lock mode is inserted into said logical lock tree node lock mode field; and if logical lock tree nodes exist for said ancestor nodes, adding either one or both of: a transaction ID to said logical lock tree transaction ID fields and adding said lock mode to said logical lock tree node lock mode fields;

else

creating logical lock tree nodes for said ancestor nodes, inserting IDs of said ancestor nodes into said logical lock tree node ID fields, inserting a transaction ID into said logical lock tree node ID fields, inserting a transaction ID into said logical lock tree node transaction ID fields, and inserting a lock mode into said logical lock tree node lock mode fields.

12. (**Original**) An article of manufacture comprising a computer usable medium having computer readable program code embodied therein which implements concurrent access control of prefix encoded nodes in a hierarchically structured document comprising modules implementing code for:

a. processing an explicit lock request on a node by determining ancestor nodes from said node,

b. deriving implicitly from said explicit lock request, a set of locks for said determined ancestor nodes,

c. comparing said derived set of implicit locks with existing lock modes for said determined ancestor nodes, and

d. granting or denying said explicit lock request on said node based on results of said

comparing step.

13. **(Previously Presented)** The article of manufacture of claim 12, wherein said hierarchically structured document is an XML document.

14. **(Previously Presented)** The article of manufacture of claim 12, wherein said node is comprised of data and a node identifier (ID).

15. **(Previously Presented)** The article of manufacture of claim 12, wherein said explicit lock mode is any of: a shared (S), update (U), or exclusive (X) lock mode.

16. **(Previously Presented)** The article of manufacture of claim 15, wherein said implicit lock mode is any of: an intention-shared (IS), intention-exclusive (IX), or a shared, intention-exclusive lock (SIX) mode.

17. **(Previously Presented)** The article of manufacture of claim 16, wherein

a. an explicit lock request on said node in lock mode S derives a set of implicit locks in IS mode,

b. an explicit lock request on said node in lock mode X derives a set of implicit locks in IX mode,

c. an explicit lock request on said node in lock mode IS derives a set of implicit locks in

IS mode,

d. an explicit lock request on said node in lock mode IX derives a set of implicit locks in IX mode, and

e. an explicit lock request on said node in lock mode SIX derives a set of implicit locks in SIX mode to be applied to said determined ancestor nodes.

18. (**Previously Presented**) The article of manufacture of claim 17, wherein said comparison step results in compatibility between said existing and derived lock modes if lock request mode for said node is:

a. IS and said ancestor nodes are locked in any existing mode of: IS, IX, S, or SIX,

b. IX and said ancestor nodes are locked in either existing mode of: IS or IX,

c. S and said ancestor nodes are locked in either existing mode of: IS or S,

d. SIX and said ancestor nodes are locked in existing mode of IS, and

e. X and said ancestor nodes are not currently locked;

otherwise

said comparison step results in incompatibility between said existing and derived lock modes.

19. (**Original**) A system for controlling concurrent access of prefix encoded nodes in a hierarchically structured document comprising:

a. a processor receiving as input, an explicit lock request on a node and providing as output ancestor nodes determined from said node,

b. a converter receiving as input said explicit lock request and deriving as output a set of implicit locks for said output ancestor nodes,

c. a comparator comparing said derived set of implicit locks with existing lock modes for said output ancestor nodes, and

a lock request grantor, granting or denying said explicit lock request on said node based on output of said comparator.

20. (**Original**) A method for controlling concurrent access of prefix encoded nodes in a hierarchically structured document comprising steps of:

a. processing an explicit lock release on a node by determining ancestors nodes from said node; said explicit lock release requested by a transaction;

b. deriving from said explicit lock release, a set of implicit lock modes for said determined ancestor nodes, and

c. releasing locks on determined ancestor nodes corresponding to said derived implicit lock mode; said locks on determined ancestor nodes originally requested by said transaction.

21. (**Original**) An article of manufacture comprising a computer usable medium having computer readable program code embodied therein which implements concurrent access control of prefix encoded nodes in a hierarchically structured document comprising modules executing:

a. explicit lock request processing on a node by determining ancestor nodes from said node,

b. implicit derivation of a set of locks for said determined ancestor nodes from said explicit lock request,

c. a comparison of said derived set of implicit locks with existing lock modes for said determined ancestor nodes, and

d. granting or denying said explicit lock request on said node based on results of said comparing step.

Evidence Appendix

None

Related Proceedings Appendix

None